STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT BOOK

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 022006-005 Project Number: 2005-10-040

Owner: BASF Corporation - Agricultural Products

Owner's Address: P.O. Box 13528, 26 Davis Dr., Research Triangle Park, NC 27709

Installation Name: BASF Corporation - Hannibal Plant

Installation Address: 3150 Highway JJ, Palmyra, MO 63461

Location Information: Marion County, S14, T53N, R5W

Application for Authority to Construct was made for:

Modification of the Pyrrole/MMPDC manufacturing facility to allow for the production of a new broad–spectrum insecticide called 320I. 320I is a solid pesticide active ingredient. Production will use existing equipment and a new potassium methoxide ($KCOH_3$) scrubber. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required.*

☐ Standard Conditions (on reverse) are applicable to this permit.

☑ Standard Conditions (on reverse) and Special Conditions (listed as attachments starting on page 2) are applicable to this permit.

FEB - 6 2006

EFFECTIVE DATE

James L Kavanaugh

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction of modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional Office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed Special Conditions as provided in RSMo 643.075. If you choose to appeal, the Air Pollution Control Program must receive your written declaration within 30 days of receipt of this permit.

If you choose not to appeal, this certificate, the project review, your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Department of Natural Resources has established the Outreach and Assistance Center to help in completing future applications or fielding complaints about the permitting process. You are invited to contact them at 1-800-361-4827 or (573) 526-6627, or in writing addressed to Outreach and Assistance Center, P.O. Box 176, Jefferson City, MO 65102-0176.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention Construction Permit Unit.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

BASF Corporation - Hannibal Plant
Marion County, S14, T53N, R5W

1. Control Requirements – Wet Scrubber
   A. BASF Corporation - Hannibal Plant shall operate the wet scrubber (PY-16) associated with the potassium methoxide ($KOCH_3$) processing to control process emissions. The wet scrubber shall be in operation at all times $KOCH_3$ processing equipment is in use. The wet scrubber shall be operated and maintained in accordance with the manufacturer's specifications.

   B. BASF Corporation - Hannibal Plant shall maintain an operating, maintenance and inspection log for the wet scrubber which shall include the following:
      1) Incidents of malfunction(s) including the date(s) and duration of the event, the probable cause, any corrective actions taken and the impact on emissions due to the malfunction;
      2) Any maintenance activities conducted on the unit, such as replacement of equipment, etc.; and
      3) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW
Project Number: 2005-10-040
Installation ID Number: 127-0001

BASF Corporation - Hannibal Plant
3150 Highway JJ
Palmyra, MO 63461

Complete: October 18, 2005
Reviewed: December 06, 2005

Parent Company:
BASF Corporation - Agricultural Products
P.O. Box 13528
26 Davis Dr.
Research Triangle Park, NC 27709-3528

Marion County, S14, T53N, R5W

REVIEW SUMMARY

- BASF Corporation - Hannibal Plant has applied for authority to construct a modification of the existing Pyrrole/MMPDC department by the addition of process equipment, piping and instrumentation which will allow for production of 320I, which is a pesticide active ingredient.

- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process are hydrogen fluoride - CAS#7664-39-3, N,N-Dimethylformamide - CAS# 68-12-2, methanol - CAS# 67-56-1, toluene - CAS# 108-88-3 and triethylamine - CAS# 121-44-8.

- None of the New Source Performance Standards (NSPS) applies to the proposed equipment.

- The Maximum Achievable Control Technology (MACT) standard, 40 CFR Part 63, Subpart MMM, *National Emission Standards for Hazardous Air Pollutants for Pesticide Active Ingredient Production*, applies to the proposed equipment.

- Control devices in use are the existing fume control system and the existing North Waste Management area's hazardous waste incinerators (PR-47). The hazardous waste incinerators are being used to control the volatile organic compound (VOC) and organic HAP process vent emissions from the dedicated 320I aqueous and organic waste storage tanks in the existing North Waste Management area in this permit. Emissions from the process area seal pots (PY-06) are vented to the fume scrubbing system prior to the thermal oxidizer. The exit gas from the thermal oxidizer passes through a caustic scrubber for removal of acidic components formed in the thermal oxidizer. Particulate matter less than ten (10) microns in diameter (PM_{10}) emissions from the packaging of the dried product (PY-05) will be vented through the existing product baghouse (631-015). Particulate matter less than ten

(10) microns in diameter (PM_{10}) emissions from the transfer of the dried product (PY-14) will be vented through the existing product baghouse (631-073). PM_{10} and methanol (a VOC that is considered a HAP) emissions from the potassium methoxide handling process will be vented to a wet scrubber (PY-16).

- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels.

- This installation is located in Marion County, an attainment area for all criteria air pollutants.

- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2]. Number 9 hydrofluoric, sulfuric or nitric acid plants and Number 20 chemical process plants.

- Ambient air quality modeling was not performed for this review. No model is currently available which can accurately predict ambient ozone concentrations caused by this installation's VOC emissions.

- Emissions testing is required for the equipment, according to the MACT standard, 40 CFR Part 63, Subpart MMM.

- A revision to the Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

BASF – Corporation, Hannibal Plant is an agricultural chemical manufacturing installation in Marion County, Missouri. This installation is classified as a major source for construction permits, and has a Part 70 operating permit application which is currently under review (Project Number EX29400001028). The following construction permits have been previously issued to the installation from the Air Pollution Control Program.

Table 1: Previously Issued Construction Permits

Permit Number	Description
1179-EPA	Major Source permit for a Nitric Acid plant
0380-002	Installation of an Animal Feed Intermediate spray drying system
0385-002	Installation of a solid waste incinerator for herbicide wastes generated during processing
0885-005	Construction of SCEPTER and ARSENEL herbicide production lines
0887-003	Construction of ASSERT herbicide production line
0488-001	Construction of a sulfuric acid regeneration facility
0588-007	Installation of a packaging operation for THIMET and COUNTER insecticides
0988-004	Installation of a back-up flare for odor control
0489-004	Addition of bulk herbicide blending and storage facility
1189-001	Installation of the PROWL-"C" incinerator and waste storage tank
0690-005	Modification of existing equipment to increase PROWL herbicide production
0491-002	Addition of a fermenter to expand pharmaceutical plant
0392-006	Construction of bulk lime and dicalite handling equipment and storage
0393-001	Modification of existing Animal Feed Intermediate Plant
0793-001	Construction of a pellet-coating plant
0694-008	Addition of a centrifuge to increase PROWL herbicide production
0894-010	Modification to increase COUNTER insecticide production
0696-013	Modification to imidazoline (IMI-2) line
122000-003	Addition of pyrrole production plant
0997-003	Modification to increase PROWL herbicide production
062000-019	Modification to increase PROWL herbicide production
082005-014	Modification to IMI-2 herbicide manufacturing facility

PROJECT DESCRIPTION

This project will allow the production of a new broad based insecticide called 320I. Production will be done utilizing existing and new equipment in the Pyrrole/MMPDC department. 320I will be produced on a campaign basis utilizing the Pyrrole/MMPDC department for a portion of the year. The 320I insecticide is a solid pesticide active ingredient, which is subsequently used in the production of insecticide formulations at other BASF sites. Production of this insecticide is a three step process. Modifications of the Pyrrole/MMPDC department are required to manufacture this insecticide.

Existing emissions control devices will control air emissions from these modifications. Organic HAP emissions from process vents and storage tanks will be handled in the Pyrrole/MMPDC department's fume system. Organic HAP emissions from the 320I dedicated aqueous and organic waste storage tanks in the North Waste management are will be subsequently incinerated in one of the three hazardous waste incinerators in the North Waste Management area (PR-47). Liquid process waste will be handled in the existing waste storage tanks and incinerators in the North Waste Management area from the Pyrrole/MMPDC waste storage tanks.

The existing incinerators will continue to be operated in accordance with applicable MDNR Air and RCRA/Hazardous Waste Combustor MACT permit conditions and requirements.

BASF – Corporation, Hannibal Plant has requested that the expected annual throughput to the KOCH3 scrubber (631-080) is to be treated as confidential. The company believes that the information identified as confidential has competitive value because access to this data would put the company at a competitive disadvantage. Therefore, these items were identified as "Confidential".

The following production equipment will be used for the proposed project:

EP-PY-04 Building Vent (building fugitive emissions – existing emission source)
This emission point consists of the fugitive and other losses from potential agitator or pump seal failures and sample points. N, N –Dimethylformamide, methanol toluene, and triethylamine are the organic HAP emissions from this emission point.

EP-PY-05 Product Baghouse (existing emission source)
The emissions from this point consist of the PM10 and PM2.5 from existing baghouse (631-015) from the packaging of the dried product by the product supersack filler (180-008) and the swivel drum filler (180-027). The assumptions used to estimate PM10 emissions were an emission rate of 0.05 grains/ standard cubic foot to atmosphere and that the bag house was running with this loading for the full year (worst case). Emissions estimates do not include removal associated with the voluntarily installed HEPA filter downstream of the baghouse. Typical operation will be six (6) hours per day.

EP-PY-06 Thermal Oxidizer /Scrubber Discharge (existing emission source)
Emissions from this process area seal pots are vented to the pyrrole/MMPDC/320I plant's flume scrubbing system prior to removal of acidic and/or odorous components. The exhaust gas from the scrubbing system is vented to the thermal oxidation treatment system that will provide a minimum overall removal efficiency of 98% for the organic components in the vent stream. The exit gas from the thermal oxidizer passes through a caustic scrubber for removal of acidic components formed in the thermal oxide. The exit gas from the scrubber is discharged via the scrubber stack.

EP-PY-08 Drain Hold Tank (existing emission source)
This point serves the drain hold tank (633-012), which is used to collect wash water from process building floor drains. Process wastes are managed in a separate closed piping system. This tank only contains floor area wash water that may contain small amounts of organic solvents, but the tank also serves as containment for any potential spills within the process building. The tank vent is equipped with a voluntarily installed carbon canister for emissions down stream of the permitted emission point. Emissions from this point include breathing and working losses from the floor area wash water that may contain small amounts of solvents.

EP-PY-10 Sample Point and Local Equipment Ventilation (existing emission source)
Emissions from this point consist of process vapors displaced from sample jars during routine collection of process samples and emissions from equipment enclosures when equipment is opened for maintenance. Process emissions from equipment are managed through the primary process fume control system. Some equipment such as

centrifuges require routine opening for maintenance during operation. Equipment is first emptied then purged with nitrogen to the fume system before opening. Local ventilation is provided to remove the small amount of residual solvent that still may be present. VOC emissions from this point reflect estimates of losses to the local ventilation systems.

EP-PY-14 Product Transfer System Baghouse (existing source of emissions)
The emissions from this point consist of the PM_{10} from existing baghouse (631-073) from the transfer of the dried product from the batch product dryer (180-029) and the product transfer system. The assumptions used to estimate PM10 emissions was an emission rate of 0.05 grains/ standard cubic foot to atmosphere and that the bag house was running with this loading for the full year (worst case). Emissions estimates do not include removal associated with the voluntarily installed HEPA filter downstream of the baghouse. Typical operation will be six (6) hours per day.
VOC emissions from this point result from small amounts of toluene (<0.1%) that are bound with the product as a solvate and released very slowly. The average drying rate in the batch part of the drying system was used as a conservative estimate of the toluene release in the pneumatic conveying system. Also, toluene emission result from the particulate emissions above.

EP-PY-16 $KOCH_3$ Scrubber (new source of emissions)
This scrubber (631-080) will be used in the new process. Emissions of PM_{10} from the handling of potassium methoxide powder and methanol (organic HAP) will occur from this point. For emissions calculations, it was assumed that the blowers were running for the duration of each batch (worst case scenario).

EP-PR-47 Incinerator C Stack (existing source of emissions)
This point consolidates the existing three incinerators in the North Waste Management Area. For the Pyrrole/MMPDC/320I process there are two dedicated aqueous and organic waste storage tanks. These tanks are tied into the fume control system for the waste storage tanks in the North Waste Management Area. Emissions result from the combustion of tank vents fumes for 320I waste stored in these dedicated waste storage tanks. These emissions consist of VOC's from the waste streams and include methanol and toluene, which are organic HAPs. These emissions are related to tank venting only. Emission point PR-47 is used to represent the North Waste Area incinerators in the construction permit application. Emissions may be vented from any one of the three stacks: A, B or C, depending on where the fume flow is directed. The same compounds and amounts of emissions will also be result from the A or B incinerator stacks if the flume flow is directed to those units.

The following list of chemicals and their CAS Numbers are used in the process and manufacture of 320I:

Acetic Acid CAS# 64-19-7
Benzoic Acid CAS# 65-85-0
Cyclohexane CAS# 110-82-7
N,N, -Dimethylformamide CAS# 68-12-2
Hydrazine Hydrate, 85% CAS# 302-01-2
Methanol CAS# 67-56-1
Potassium Methoxide CAS# 865-33-8
Toluene CAS# 108-88-3
Triethylamine CAS# 121-44-8
320 - Easter ((3-Trifluromethyl) benzoic acid methylester CAS# 2557-13-3
320 -Isocyanate (4-Trifluoromethoxy phenyl isocyanate) CAS# 35037-73-1
320 – Nitrile (p-Tolunitrile) CAS# 104-85-8
320I technical CAS# 139968-49-3

EMISSIONS/CONTROLS EVALUATION

Existing potential emissions of all criteria pollutants are assumed to be greater than major source levels. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). The following table provides an emissions summary for this project.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory *De Minimis* Levels	Existing Potential Emissions	Existing Actual Emissions (2004 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM_{10}	15.0	Major	116.93	3.93	N/A
SOx	40.0	Major	1956.86	N/A	N/A
NOx	40.0	Major	361.77	6.8	N/A
VOC	40.0	Major	21.02	14.12	N/A
CO	100.0	Major	113.8	1.5	N/A
N, N –Dimethyl-formamide	10	N/D	N/D	0.47	N/A
Methanol	10	N/D	N/D	0.58	N/A
Toluene	10	N/D	N/D	7.47	N/A
Triethylamine	10	N/D	N/D	0.21	N/A
Hydrogen Fluoride	10	N/D	N/D	0.0004	N/A
Combined HAPs	25.0	Major	22.31	8.73	N/A

*N/A = Not Applicable; N/D = Not Determined

Per the instructions established for the Emission Inventory Questionnaire (EIQ), those HAPs that are either VOCs or Particulate Matter less than 10 microns (PM_{10}) can be reported as VOC on the EIQ. The HAPs calculated for this project are counted as VOC on the EIQ with the exception of Hydrogen Fluoride. Hydrogen Fluoride is only considered a HAP. Hydrogen Fluoride is the only HAP present that is not considered an organic HAP. It is not destroyed in the Thermal Oxidizer, but is scrubbed out in the caustic scrubber. The destruction efficiency is 95 percent for the HAP removal by the scrubber. Organic HAPs and VOC have the same destruction efficiency of 98% in the Thermal Oxidizer. The destruction efficiency of the C incinerator is based on past performance tests of the unit which were made in compliance with 40 CFR 264.343.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of criteria pollutants are below de minimis levels.

APPLICABLE REQUIREMENTS

BASF Corporation - Hannibal Plant shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- Submission of Emission Data, Emission Fees and Process Information, 10 CSR 10-6.110
  The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions.

- *Operating Permits*, 10 CSR 10-6.065

- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170

- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220

- *Restriction of Emission of Odors*, 10 CSR 10-3.090

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400

- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Hazardous Air Pollutants for Pesticide Active Ingredient Production,* 40 CFR Part 63, Subpart MMM

- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260

- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating,* 10 CSR 10-3.060

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Timothy Paul Hines
Environmental Engineer

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated 10/17/2005, received 10/18/2005, designating BASF Corporation - Hannibal Plant as the owner and operator of the installation.

- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.

- Northeast Regional Office Site Survey, dated 10/28/2005.